Triaxial Bulges in Barred Galaxies

Ann, Hong Bae
Department of Earth Science, Pusan National University
Park, Nam Gyu
Institute of Astronomy and Space Science

We have found that the bulges of a significant fraction of barred galaxies are elongated into secondary nuclear bars, by a close examination of the two-dimensional luminosity distribution of 112 bright barred galaxies which were obtained with the 105cm Kiso Schmidt telescope. Most of the morphological types of galaxies which have distinguished nuclear bars are $T=-1$ or $T=3$. The small inner bars, i.e., triaxial bulges tend to be aligned perpendicular to the main bars. We present the detailed morphology of the triaxial bulges by making use of the isodensity tracings, isophote maps, and luminosity profiles. The nature of triaxial bulges is discussed in connection with dynamical models.

Detection of Excess Rotation Measure due to Intracluster Magnetic Fields in Clusters of Galaxies

K.-T. Kim
Department of Astronomy and Space Science,
Chungnam National University, Daejeon 305-764, Korea

The Faraday rotation measures of a sample of extragalactic radio sources projected within a third of an Abell radius of a galaxy cluster were compared with those of sources located further from cluster centers. The result strongly indicates that the distribution of the residual rotation measure in the former population is broadened, at a confidence level exceeding 99%. The broadening is detectable out to 1 h_{50}^{-1} Mpc. Our best estimate of the excess Faraday rotation measure varies from 100 ± 36 rad m^{-2} in the central sixth of an Abell radius to 36 ± 15 rad m^{-2} further out. The combination of these results with electron densities determined from X-ray data for some of the clusters suggests that magnetic field strengths in cluster gas are of order of 1 microgauss.

Photometric Evolution of Galaxies: Programs and Initial Results

Lee, Chang-Won and Ann, Hong Bae
Department of Earth Science, Pusan National University

We present some initial results of newly developed numerical models for the photometric evolution of galaxies. In the models, stars are formed from interstellar gas evolve along the theoretical evolutionary tracks. At the end of giant branch tracks stars die and become dark matter with ejection of substantial fraction of gas into intersteller medium. We performed the numerical integrations in time steps of 3×10^6 year in order to calculate the bolometric luminosity, UBV colors, luminous and dark matters of a model galaxy. We take into account the metallicity effect on UBV colors by using evolutionary tracks with different metallicity for successively formed stars. Among

others, it is found that the UBV colors of galaxies (from ellipticals to irregulars) can be explained with exponentially decreasing star formation rates and bimodal initial mass functions.

Inflation and Generation of Primordial Black Holes

Chungyun Cho and J. J. Hyun
Department of Astronomy, Seoul National University

The formation of primordial black holes in 'two scalar fields' model is investigated. The scalar field ϕ_1 is one of Linde's chaotic inflationary field and scalar field ϕ_2 is is the adjoint Higgs field of SU(5) grand unified theory with Coleman-Weinberg spontaneous symmetry breaking. It is assumed that inflation is driven by ϕ_1. It is shown that primordial black holes can be produced right after the critical temperature of ϕ_2 (i.e., $\approx 1.31\times10^{14}$ Gev). If the reheating temperature is 1.48×10^{14} Gev, black holes with $M\approx$1kg are formed and the total mass of the black holes produced then within 10cm, corresponding to today's horizon, is about 10^{55}g—the horizon mass of the present Universe.

The Effects of Initial Mass Function and Star Formation Rate on the Galactic Chemical Evolutions

Rim, Jung Ea and Ann, Hong Bae
Department of Earth Science, Pusan National University

We investigated the effects of the Initial Mass Function (IMF) and Star Formation Rate (SFR) on the galactic chemical evolutions using numerical models based on the disk-halo two zone model of Lee and Ann(1981). In our models metal free intergalactic gas comes into halo and dilutes the halo metals, while the enriched gas from massive halo stars increases the disk metal abundance in the initial period of disk evolution. We also take into account the radial gas flow in the disk evolution. The models with time-dependent IMFs can solve the G-dwarf problem and agree with the observations in the solar neighborhood. The power law SFR (n=2) well describes the chemical history of the solar neighborhood, if there is no more stellar formation in the halo after the initial period of the halo formation.

The Development of a Cryogenic 40 GHz-Band Receiver

Seog-Tae Han, Chang-Hoon Lee, Young-Sun Park,
Hyun-Goo Kim, Se-Hyung Cho, Jeong-Bin Seo
Daeduk Radio Astronomy Observatory
Institute of Space Science & Astronomy

We built a cryogenic receiver working at the frequency range 35 GHz~50 GHz for the cosmic radio observations for the first time in Korea.

A GaAs Schottky diode was employed for the biased cryogenic balanced mixer. We used the three stage HEMT amplifier for the first amplifications, which has a 400 MHz bandwidth at the center